PRINCIPES

Journal of The Palm Society

Photo by Dent Smith

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THE PALM SOCIETY

A non-profit voluntary association primarily engaged in the study of the palm family in all its aspects throughout the world.

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Principes, plural of the Latin noun *princeps*, is an alternative name of venerable age for the palms—"the Princes of the the vegetable kingdom." The word is pronounced as the Latin Americans pronounce it, with the accent on the first syllable. Webster, in anglicized Latin, has it Prin-si-pez.

* * *

Fortunately, not much bragging was indulged in about the marvelous qualities that would dazzle the readers of this maiden issue of PRINCIPES. It is not up to the standards that had been visualized for it. It is just as well, then, that we did not threaten to manufacture a cannon and turn out a pop-gun instead. What ails this first issue chiefly is the want of good contemporaneous text and enough good pictures. We cannot produce either out of thin air, but dare hope that one member here and another there will shortly begin to contribute some of each.

Owing to the lack of original matter it has been necessary to resort to writings that first saw print a long time ago. Not to say that reprints of inaccessible writings are without virtue; they have their merits, but we are in sore need of matter that adds to the supply of knowledge and injects today and tomorrow into the business.

Manuscripts containing anything from a short paragraph up to 5,000 words, if competent and suitable, will be published in PRINCIPES. MSS. properly prepared for the printer are typed on 8½ x 11 white bond paper, double-spaced. They should come to hand not later than thirty days before the publication dates, which are January 1st, April 1st, July 1st and October 1st.

To be of the most value to its members the Society must have a representative number of original writings in its publications. The quarry is any kind of information that is pertinent.

* * *

At September 1st, 1956 the Society had 185 members. From present indications the number will exceed 200 by the middle of October. Since a roster was last published we have added one member each in several countries new for us, namely Australia, Costa Rica, Paraguay, Philippines, Jamaica, and two in the Territory of Hawaii. We already had members in the Canal Zone, Puerto Rico, Bahamas, Canada, Cuba, Dominica, France, Honduras, Mexico, New Zealand and Japan, so that now 17 geographic entities outside the continental U.S. are represented. We still have not one member in India or in the entire continent of Africa, or rather we did not at September 1st.

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COVER PICTURE — Two natives of Florida locked in a deadly but one-sided struggle—the "strangler fig," *Ficus aurea*, certain to emerge the victor over the *Sabal Palmetto*. The crown of the palmetto, already sub-standard in expanse, is discernible in the center of the fig tree. Details of the constricted trunk are shown in the Cover inset and in the two pictures at left.

Birds deposit the fig seeds in the high boots of the palmettoes or on the branches of other trees, whence aerial roots descend to the ground and forms stems which gradually surround the host trunks and merge there. In time the host dies of strangulation, the trunk slowly decays and crumbles, and the woody fig enormously expands its own trunk to fill the vacated space, so that eventually no evidence of the murder remains.

The range of the killer fig is supposed to be limited to southern Florida, where its habits may be frequently observed. In our cover picture, however, we find it far north of its presumed limits—at Daytona Beach, and very much at home there in front of a house at 138 N. Wild Olive Avenue. Obviously a northbound bird was not much concerned with phytogeography, nor was the fig itself.

From first to last a great many years must elapse before the fig, once only an epiphyte, will have finally killed the palmetto, for the trunk of the latter has no cambium layer and does not have to expand. The end will come when the fig completely engulfs the palmetto foliage, literally swallowing it up.

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Publications by John K. Small on Native Palms in the Journal of the New York Botanical Garden from 1922 to 1937

John K. Small (1869-1938) was a botanist with the New York Botanical Garden. From 1901 to 1931 he made more than 40 trips to southern Florida to collect and to study the native plants. Many of his collecting trips were reported in the Journal of the New York Botanical Garden. Two of his books are well known and represent the standard works for students of the flora of the southeastern United States. They are "Manual of the Southeastern Flora" (1933), and "Ferns of the Southeastern States" (1938). In 1922 he began a series of articles for the Journal of the New York Botanical Garden on the native palms of the United States. Reprints of these articles have been widely circulated and many fortunate individuals who became acquainted with Dr. Small on his numerous trips to Florida have copies of these papers. Many of the libraries either have the reprints or have the New York Botanical Garden Journal series in which these papers originally appeared. For those readers interested in our native palms it would reward them to read these very interesting articles.

The following is a list of papers by J. K. Small dealing with native palms.

1. The Buccaneer palm. History and distribution of *Pseudophoenix Sargentii.* Jour. N. Y. Bot. Gard. 23:33-43. 2 photos. 1922.

2. The saw cabbage palmetto. The history and distribution of *Paurotis Wrightii.* Jour. N. Y. Bot. Gard. 23:61-70. 3 photos. 1922.

3. The blue stem—*Sabal minor.* Jour. N. Y. Bot. Gard. 23:161-168. 1 Photo. 1922.

4. The needle palm—*Rhapidophyllum hystrix.* Jour. N. Y. Bot. Gard. 24:105-114. 2 photos. 1923.

5. The cabbage tree—*Sabal Palmetto* Jour. N. Y. Bot. Gard. 24:145-158. 2 photos. 1923.

6. The silver palm—*Coccothrinax argentea.* Jour N. Y. Bot. Gard. 25:237-242. 2 photos. 1924.

7. Silk-top thatch — *Thrinax parviflora.* Jour. N. Y. Bot. Gard. 26:49-54. 1 photo. 1925.

8. The scrub palmetto—*Sabal etonia.* Jour. N. Y. Bot. Gard. 26:145-151. 2 photos. 1925.

9. The saw palmetto—*Serenoa repens.* Jour. N.Y. Bot. Gard. 27:193-202. 4 photos. 1926.

10. The palmetto palm—*Sabal texana.* Jour. N Y Bot. Gard. 28:132-143. illust. 1927.

11. The James palmetto—*Sabal Jamesiana.* Jour. N. Y. Bot. Gard. 28:181-185. 1 photo. 1927.

12. The royal palm—*Roystonea regia* Jour. N. Y. Bot. Gard. 29:1-9. 3 photos. 1928.

13. The coconut palm—*Cocos nucifera.* Jour. N. Y. Bot. Gard. 30:153-161. 194-203. illust. 1929.

14. Palmetto with a stem—*Sabal Deeringiana.* Jour. N. Y. Bot. Gard. 30:278-284. 2 photos. 1929.

15. Chronicle of the palms of the continental United States. Jour. N. Y. Bot. Gard. 31:57-66. illust. 1930.

16. The brittle thatch—*Thrinax microcarpa.* Jour. N. Y. Bot. Gard. 32:1-6. 2 photos. 1931.

17. The fanleaf palm—*Washingtonia filifera.* Jour. N. Y. Bot. Gard. 32:33-43. 2 photos. 1931.

18. The rapid growth of the royal palm. Jour. N. Y. Bot. Gard. 36:217-220. 2 photos. 1935.

19. The remarkable vitality among palms. Jour. N. Y. Bot. Gard. 36:261-220. 6 photos. 1935.

20. Palms as indicators of the maximum water level. Jour. N. Y. Bot. Gard. 37:231-235. 3 photos. 1936.

21. Facts and fancies about our royal palm. Jour. N. Y. Bot. Gard. 38:49-58. 3 photos. 1937.

22. Palms of the continental United States. Scientific Monthly. 32:240-255. 19 photos. 1931.

The Needle Palm — Rhapidophyllum Hystrix

JOHN K. SMALL

Reprinted without the footnotes, from JOURNAL OF THE NEW YORK BOTANICAL GARDEN 24:105-114, 1923

If one should thrust his hand close to the stem of this palm he would promptly understand why the name needle-palm was applied to this plant. Numerous long, slender, needle-like structures constitute an important part of the leaf-sheath by being woven together by coarse pliable fibers.

Botanically, this palm, which is quite unique in our flora, is only a little over a century old. However, the needle-palm is suggestive of a very ancient type of vegetation. Besides its very specialized leaf-sheath, its flowers are dioecious; that is, the staminate flowers and the pistillate flowers are borne on different plants.

From the standpoint of plant geography, the needle-palm is particularly instructive. Most of our native palms are related to tropical American species or are identical with them. In some cases their ancestors may have migrated from the West Indies to Florida. It is different in the case of the needle-palm, for its relatives are now on the opposite side of the globe, or, in other words, they inhabit southeastern Asia. The primitive history of this plant is, of course, wholly lost. We are safe in believing that its geographic range was more extensive in later geologic times than at present. It is now restricted to a limited area in and near the southeastern Coastal Plain. It probably originated in or migrated to southeastern North America at the same time that the other types of plants that are common to eastern North America and to eastern Asia flourished—*Tumion, Croomia, Hugeria.* At all events, its ancestry is lost in geologic time.

As in the cases of some of our other Asiatic plant-relatives, this palm may have inhabitated the highlands, perhaps both the high and the low country, or maybe only the more elevated parts. If this condition existed before the glacial times, the rigors of that period either exterminated the species in the highlands, sparing those in the lowlands, or some representatives retreating to the lowlands took shelter in protected places and maintained a representation of the species to the present.

As a species the needle-palm does not suggest vigor or aggressiveness. It is, doubtless, one of those plants which is on the verge of becoming extinct through natural agencies. Of course, this era of extinction means a long period of time, but were it not that the plant usually grows in the kind of place less frequently disturbed by man in his methods of civilization, the time would be much shortened by artificial agencies. Supposing the palm really inhabitated the higher lands to the northward of its present geographic area, it now does not show any inclination to reestablish itself in its former domain.

Recent field studies have brought to light some very interesting facts in the life history of this palm, and disclosed the reasons for its non-aggressiveness. For some reason the inflorescence, both staminate and pistillate, is much contracted or congested; even the spadix is short and the flower clusters borne close to the spadix are hidden in the mass of needles and wool-like fibers, together with more or less accumulated foreign matter, in the crown of leaves. The inflorescence never protrudes, not even in fruit, as it does in our other palms. So exaggerated is this contraction of the inflorescence, that the whole cluster of fruit remains in the crown until they either decay or sprout, if enough humus and moisture accompany the cluster. If the fruits do sprout, the seedlings rarely survive, for they usually have insufficient material to support growth. We have found clusters of fruits, mostly decayed, that have lain in the crown of leaves for at least two years. Under favorable circumstances the seeds sprout *in situ.* We have found clusters of two dozen young seedlings standing in the crown of leaves, few, if any, of

them, however, with the slightest chance of growing to maturity. Apparently the only agency for distributing the seeds is that of animals seeking the fruits as food, but the chances for distribution by this method are limited on account of the armament which bristles about the fruit-cluster.

As a result of this decided limitation to the perpetuation of the species through the sexual method of reproduction, the needle palm, it would seem, has provided a vegetative method of continuing its existence. The underground stem usually promptly produces one or more little protuberances. These soon grow out as offsets, lengthen to six to eighteen inches and support a small palm at the tip. We have found parents with as many as fifteen small palms attached to the main stem. Of course, this is an effectual way of perpetuating the species, but it does not tend to increase the geographical area very rapidly. The progeny apparently remain attached to the parent stock until it dies. This process repeated many times would not remove the ultimate descendants very far from the starting point. The offsets are quite sure of surviving, for the armament, which tends to restrict the distribution of the fruits, also tends to protect the bud of the offset from the depredation of rodents.

Palms were less well understood by our early American botanists than many of the more widely distributed plants, and those of the less remote parts of the country; the lines of generic distinction were not at all clear to them.

If William Bartram's "Corypha repens, frondibus expansis, flabelliformibus, plicatis, stipit. spinosis" really refers to the needle-palm, as some palm-students have maintained, we have quite an early botanical starting-point for this plant, both in the matter of discovery and of name. However, the application of the above description to the palm in question is doubtful, and we have now associated it with the saw-palmetto.

Subsequent to the discovery, Frederick Pursh named, described, and published the needle-palm as *Chamaerops Hystrix*, thus including it in the genus which embraces the common palm of the Mediterranean region of the Old World. The specific name was well chosen. It means porcupine, and refers to the stem, which is bristly with the spines of the leaf-sheaths. It was discovered "near the town of Savannah, Georgia." Pursh refers to the plant as follows:

"This singular palm grows in company with others, and distinguishes itself by its long aculei, resembling porcupine quills, and often growing to the length of more than fifteen inches."

About four years after Pursh described the needle-palm, William Baldwin wrote a letter concerning the palms of Amelia Island, Florida, in which he said:

"Chamaerops hystrix is found along with the preceding (Sabal Adansonii)—which it resembles closely, with the exception of its singular spines. It was discovered by the late Mr. John Fraser, about sixteen years ago, near the city of Savannah."

In 1817, Stephen Elliott printed the following note in his sketch of the Botany of South Carolina and Georgia:

"This palm was first noticed by the late Mr. Fraser. The leaves or fronds attain the heights of four to five feet. It is remarkable for the thorns, like porcupine quills, which grow from the root, intermingled with the fronds. It is found in rich, clayey soils, along the margin of swamps, and from its peculiar deep green color is sometimes called 'Blue Palmetto.' "

In the following year Thomas Nuttall, having observed the plant, published a note concerning it as follows, at the same time transferring it to the genus *Sabal*.

"The fronds indistinguishable from those of the preceding species (Sabal Adansonii) by any other character than the appearance of long axillary spines; the inflorescence has not yet been compared; its rare occurence amidst so much of S. Adansonii leads to a suspicion of its validity as a distinct species. In the vicinity of Savannah pointed out to me by the

kindness of Dr. Baldwin."

Several years later Thomas Nuttall, in publishing some notes referring to plants collected by Nathaniel Ware said: "In this species, whose fronds resemble the preceding (Sabal Adansonii), the stipe is naked and triangular, not simply convex beneath; in the basalar axils of which a matted tomentose substance, almost similar to coarse brown wool, and intermixed with spines half a foot long, and rigid as needles, within these radical sheaths is enclosed the clandestine spadix loaded with hirsute brownish drupes, the size of coffee berries, and recent possessing an eatable sweetish pulp, with which the Aborigines are acquainted."

Carl Friedrich von Martius, in his classic work on palms, after fully describing the plant, says: "Grows in Georgia, near Savannah, and in other places, more frequent in Eastern Florida, Fraser, Bartram, Pursh, Nuttall, Ware. Called by the inhabitants, creeping palmetto."

Nearly forty years more passed by during which this palm, when referred to, still appeared under the generic name *Chamaerops*.

However, in 1876, students of the palms, Hermann Wendland and Oscar Drude properly interpreted it. Heretofore this very characteristic palm had masqueraded under at least four generic names, *Chamaerops, Corypha, Sabal, Rhapis*. Seeing that it belonged to none of these on account of its different morphological characteristics in the leaves and inflorescence, Wendland and Drude named it *Rhapidophyllum*, a name referring to the needle-like structure in the leaf-sheath.

The needle-palm ranges naturally from South Carolina to central Florida and Alabama, and is, perhaps, in Mississippi. It grows mainly in low sandy woods and swamps, particularly in river swamps. It also occurs in the limestone fern grottoes of northern peninsula Florida, where it may be found in the low depressions, or seated on top of the highest rock outcrops where the plants are much reduced in size. However, it is in the alluvium of the swampy flood plains of rivers that the palm reaches its maximum development and best proportions. There it proves itself to be the most graceful and beautiful of our stemless native palms.

Its armament is such a conspicuous character that the plant has often been called the "vegetable porcupine."

PROFESSOR ARMANDO DUGAND, of Barranquilla, Colombia, transmits to the Society these succinct remarks on the palms of his country:

"It may interest the readers of the Bulletin that the known Palm flora of Colombia--which I believe to be second richest in the world, being preceded only by Brazil's—now exceeds 300 species of 58 recognized genera, among which are found both the tallest and the smallest kinds, namely the lofty Quindio Wax Palm (*Ceroxylon quindiuense* which attains a height of 160 feet—and occasionally as much as 200—and the recently described *Malortiea pumila*, a dwarf scarcely two feet tall when fully adult.

"Colombia may also boast of the widest altitudinal range in Palm distribution: from the sultry lowland forests of the Tropical Zone teeming with species of many genera, to the cold, misty upper slopes of the Andes where *Ceroxylon utile* is found growing at 13,400 feet above sea level, not far below snow line."

Photo by Dent Smith

African oil palm growing at Daytona Beach, Fla. Set out when two years old and two feet high, it is now only six years old, its longest leaves to eleven feet. It has not yet flowered or fruited as it might have done in a warmer climate; but it has been an extremely rapid grower even at 29° north latitude.

UNITED FRUIT COMPANY PLANTATIONS OF AFRICAN OIL PALM IN CENTRAL AMERICA

By

Division of Tropical Research, United Fruit Company
La Lima, Honduras

In Florida, the African oil palm (*Elaeis guineensis*) is known primarily as an ornamental tree but in more tropical regions it is grown on plantation scale. Its oil is highly valued in world trade for the manufacture of shortening, margarine, and soap. It is also used in sheet steel and tin-plate production in limited quantities.

The African oil palm is considered native to the Guinea coast of Africa where it flourishes between 16° north and south of the equator. It has done equally well in Sumatra, Java, and Malaya which come within these latitudes. The United Fruit Company started Central American commercial plantings in Honduras and Costa Rica in 1944 and in Nicaragua in 1946. These areas also fall within this equatorial zone and soil and climatic conditions are quite similar to those in other areas where oil palm prospers. By the end of 1955, the United Fruit Company had about 17,000 acres planted to oil palm in these three Central American countries, including a small acreage in Colombia.

Since 1950, production has been sufficiently high to encourage the establishment of factories for processing shortening and soap. The entire production of these plantations is consumed in the countries where it is grown, reducing imports in these countries of either raw materials for making their own products or of finished products from foreign sources. In 1955, for instance, 8,550,000 pounds of pericarp oil were produced.

Steps in the establishment of these oil palm plantations will be of interest to Palm Society members. Although United Fruit Company commercial plantings were not begun until 1944, the ground work was laid in 1926-28 with the collection of varieties from Malaya, Java, Sumatra, and Africa which were established in small plantings at the Lancetilla Experiment Station, near Tela, Honduras.

These were observed and tested for growth, production, and quality until 1942 when intensive field tests and laboratory studies showed the Deli strain from Java to be the most satisfactory for growing conditions in this area. From these small trial plantings have come the selected seed which went into the planting of these extensive plantations throughout Central America.

Seed selection is one of the most important steps to insure healthy, vigorous, high-producing trees. Heavy-bearing trees with high oil yield are selected. Mature fruit bunches are left in the sun for a few days after harvesting until ripe fruits fall off the bunch. These loose fruits are cleaned with sand in a revolving drum to remove pericarp. The nuts are then washed and only the largest and best formed are selected for drying after which they are ready for planting, storage, or shipping.

Best germination is obtained by placing the seed, with the long axis horizontal, about one-fourth inch deep in sand frames and covering them with a thin layer of sawdust. The frame should be fully exposed to the sun and kept wet. The sawdust helps retain moisture. Under these temperature and moisture conditions, about 50 per cent of the seed will germinate within eight weeks.

When the seedling is about five inches tall, it is transferred to a nursery bed where planting distance is 18 inches. Care must be taken at this stage not to separate the roots from the seed as the plant still feeds from the endosperm inside the nut. Transplanting to nurseries should be

done on cloudy or rainy days or under shade which may be removed after a few days.

Nursery beds should be in light clay soils, carefully prepared, provided with good drainage, and irrigated daily for best results. Protection against rodents and grazing animals may be required.

Site for final field plantings should be carefully chosen. Well-drained, flat coastal lands or inland alluvial plains up to 1,000 feet in altitude are best for oil palm growth. Rainfall should be well distributed throughout the year with an average of at least 100 inches annually. Growth of young plants is retarded and production of mature trees reduced in zones of low rainfall or with long dry periods. On the other hand, excessive amounts of rainfall or long cold periods are also detrimental to oil palm growth. Ideal soils are well-drained loams or light clays.

Land may be prepared for field planting mechanically with power equipment or by hand. Mechanical cultivation is preferred because it is less costly and produces better growing conditions. Land should be chopped, burned, and stumped during dry weather. Then it is lined out for spacing of 30 x 30 feet hexagonal planting for a population of 55 trees per acre. Closer planting would result in taller trees with fruit higher and more difficult to harvest. If the land is prepared by hand, only chopping of bush and cleaning of plant lanes at 30-foot intervals are necessary.

After 12 to 18 months in the nursery, the healthiest and most vigorous plants, 3 to 4 feet tall, are selected for field planting. The young plants must be carefully dug with a ball of soil around the roots which are then enclosed in burlap for transporting to the field. Planting holes of sufficient size to accommodate the balled root system have been prepared in advance. The burlap is removed and the young trees set out in the holes but they must not be placed deeper in the soil than the level at which they grew in the nursery. Field planting should be made when the ground is moist and moderate rains can be expected during the following three months.

Young oil palm plantations may be mechanically cultivated with a harrow or brush cutter every 2 to 3 months to keep down grass and bush or chopped by hand with a machete annually. In addition, plants may be circled and planting lanes cleaned as required. Too much shade weakens the small plants and results in spindly growth.

Maintenance costs may be lowered by interplantings of catch crops such as corn or beans which would produce a certain income before the oil palms come into bearing. However, such double cropping may deplete the soil and the young palms may suffer. Also, rats may be attracted to the plantation and the harm to the trees would not be offset by the small increase in income.

Fertilizers, although they would be beneficial, are not generally necessary for African oil palm under our conditions to date. Cover crops, such as *Pueraria javanica*, may be used in retarded areas but again the rat problem must be considered before planting a green manure.

To protect the young palm trees from rodents, collars or guards should encircle the base of each tree. Strips of 2 x 2 mesh (1/2-inch mesh, 2 per inch) 18-gauge hardware cloth are cut 18 inches long by 6 inches wide. Each strip is embedded one inch in the soil around the base of the plant, the remaining five inches extending above the soil and being secured around the trunk of the tree. The guards should be removed before they choke the trunk of the tree or become enmeshed in the roots. The young plants should also be protected from grazing cattle which destroy the heart of the growing tree.

Good insurance for high production is the early replacement of slow growing or low yielding trees which should be carefully observed. Hand pollination may increase production but the possibility of permanently damaging the trees by

forcing one or two heavy crops in young plantations should be considered before adopting such a technique. Pruning is not required except at harvest time when dead leaves and the frond supporting the fruit may be cut off.

Palms begin flowering in the second and third years in the plantation and some fruit may be set in the third year. Large-scale fruiting probably will not begin until the fourth year but the fruit bunches will be very small, only 2 to 3 pounds each. However, they may be numerous; sometimes more than twenty bunches may be counted on one palm tree at once.

Successive fruitings increase in size but decrease in numbers until by the fifth year, fruit bunches average 35 pounds. This increases to 50 pounds per bunch after the tenth year of production. The largest bunch yet harvested in Honduras weighed 157 pounds. Although some mature fruit is found in the plantations throughout the year, 75 per cent of the annual production is harvested between June and December.

Young palms grow comparatively slowly in height but the trunks broaden noticeably and succeeding leaves become longer. Fruits are set between the frond petioles of the lowest leaves and the trunk. First bunches produced are almost at ground level around the trunk of the palm and succeeding bunches grow progressively higher on the trunk. For the first 6 or 7 years, fruit may be harvested by a man standing on the ground but for later crops, small ladders are propped against the tree to enable the worker to harvest the fruit.

Fruit develops in about six months after flowering. Immature fruit of the Java strain are usually shining black, changing to deep reddish orange at maturity. The oil is formed in the pericarp during the last few weeks of growth, coinciding with the change in color. Harvesting is done on a 6 to 9 day cycle to prevent loss of fruit which, when overripe, falls from the bunch and decomposes on the ground.

Fruit is harvested with a specially designed knife. The frond petiole which supports the fruit is cut off about 8 inches from the trunk to facilitate the removal of the bunch. Care should be taken to eliminate bruising the fruit which lowers the quality of the oil. Harvested bunches are carried by muleback to a central road system for delivery to the factory or processing plant.

In comparison with other crops, African oil palm has been relatively free from serious pests or diseases in Honduras. The most commonly found source of damage is from rats and mice gnawing the heart of the young palms at ground level. Another rodent, the pocket gopher (locally called taltusa) has caused damage in restricted areas of light soil during dry weather. Poison baits and traps have controlled the taltusa. Clean cultivation with tractor and harrow or brush cutter tends to eliminate both rats and gophers by preventing grass and bush growth. This destroys nesting sites for rats and underground tunnels of the gophers.

Insect damage in even the oldest Honduras plantings has been slight and intermittent. Migratory locusts and Rhinoceros beetle have caused damage which has not been severe enough to warrant control measures. In the newer and larger plantations, scattered cases of "bitten leaf" caused by the fungus *Phytophthora palmivora* have been observed but the plants generally recovered without treatment.

Does your country have postage stamps bearing the likeness of a palm? If so, send us an uncancelled stamp - and we will reproduce it in this journal.

The Palms of Chapman Field

Chapman Field, before we say any more, is an unofficial synonym for the U. S. Plant Introduction Garden, Coconut Grove, Florida. The palm collections there are among the best and most impressive in the country. They contain many palms seldom met with in American gardens and are especially noteworthy for the greater age and larger size of numerous specimens.

This article is a continuation in a series of efforts to learn what palms are actually in cultivation in this part of the world by recording lists of the palms growing in various gardens. Not all the palms in the Introduction Garden list, appended below, have yet reached full size, but all have been in the ground long enough and have grown sufficiently well to assure their continuing to thrive under the conditions obtaining at the Garden.

Massive plantings of Phoenix species along the drainage canal, with tall specimens of *Elaeis guineensis* and many other palms adding to the ranks of magnificent fronds, are a sight to stir the admiration of any palm lover. Besides a wealth of gorgeous palms throughout the section, there are some not gorgeous but still fetching enough, some thoroughly ungorgeous but still of compelling interest (for example, two bifurcate Hyphaene palms), and some that are more noble than they are gorgeous (e. g., the appropriately named *Bismarckia nobilis*). The Garden, in short, is not a carbon copy of other notable palm plantings in the area, and the fancier could spend two full days or more in profitable observation there.

As noted elsewhere in this number of PRINCIPES, there is a dearth of Borassus palms in American gardens. Not so, however, at the Introduction Garden; 16 Borassus palms all listed there as *B. flabellifer* have been in the ground 15 years or longer, and although several are still quite small, three of the largest have flowered. Unluckily these three are all males. A few of the specimens may prove to be *B. ethiopum* instead of *B. flabellifer*. According to Dr. Fairchild, the seed resulting in the largest specimen - now a ponderous tree grown in a pothole - was shipped in 1927 from West Africa, and the tree probably is, as he believed, *B. ethiopum*.

The practice in listing the palms at the Garden has been to decapitalize all specific names. In the list below we have capitalized the initial letters of certain of those specifics only because of our adoption of Bailey's procedure on that score. The names themselves have not been altered, though a few of them are not currently of wide recognition; but such binomials as *Caryota plumosa*, if not taxonomically acceptable, nevertheless represent distinctive species differing from other palms of the genus in the Garden.

The list is not a complete one, having been held, rather, within the limits defined below.

LIST OF PALMS DEFINITELY ESTABLISHED AT THE U. S. PLANT INTRODUCTION GARDEN, COCONUT GROVE, FLORIDA, AT AUGUST 15, 1956.

Acrocomia armentalis
sclerocarpa
Adonidia Merrillii
Aiphanes caryotaefolia
Lindeniana
Archontophoenix Alexandrae
Areca Cathecu
Arecastrum Romanzoffianum
Arenga Ambong
saccharifera
Wightii
Arikuryroba schizophylla
Astrocaryum alatum
Murumuru
Standleyanum
Attalea crassispatha
Bactris balanoidea
Bentinckia nicobarica
Bismarckia nobilis
Borassus flabellifer
Brahea dulcis

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oblongata
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Chrysalidocarpus lucubensis
lutescens
madagascariensis
Coccothrinax argentata
argentea
crinita
Dussiana
Martii
Cocos nucifera
Copernicia Burretiana
cerifera
Curbeloi
gigas
Torreana
Yarey
Corozo oleifera
Corypha elata
talliera
umbraculifera
Cryosophila Warscewiczii
Daemonorops niger
Desmoncus oxyacanthos
Dictyosperma album
album var. rubrum
aureum
Diplothemium caudescens
Drymophloeus Beguinii
olivaeformis
Elaeis guineensis
Eleutheropetalum Ernesti-Augusti
Sartori
Erythea aculeata
armata
Pimo
Eupritchardia affinis
Lowreyana
pacifica
Thurstonii
Gaussia attenuata
Geonoma sp. (Colombian)
Glaziova Treubiana
Guilielma Gasipaes
Heterospathe elata
Hexopetion mexicanum
Hyphaene turbinata
Latania borbonica
Loddigesii
Licuala grandis
spinosa
Livistona altissima
chinensis
decipiens
Hoogendorpii
Mariae
Saribus
Mascarena lagenicaulis
Verschaffeltii
Mauritia flexuosa
Nannorhops Ritchieana
Nipa fruticans
Oothrinax anomala
Opsiandra Maya
Orbignya Cohune
speciosa
spectabilis
Paurotis Wrightii
Pelagodoxa Henryana
Phoenix abyssinica
acaulis
canariensis
dactylifera
farinifera
pusilla
reclinata
Roebelenii
rupicola
sylvestris
tomentosa
zeylanica
Pinanga Kuhlii
Pseudophoenix saonae
Sargentii
vinifera
Ptychosperma elegans
Raphia vinifera
Rhapis excelsa
Rhyticocos amara
Roystonea borinquena
elata
regia
Sabal Beccariana
causiarum

932416

glaucescens
mauritiaeformis
mexicana
nematoclada
Palmetto
minor
texana
umbraculifera
Scheelea butyracea
gomphococca
Humboldtiana
Lauromuelleriana
Siphokentia Beguinii
Syagrus coronata
orinocensis
Thrinax microcarpa
Morrisii
parviflora
punctulata
Trachycarpus Martiana
Trithrinax acanthocoma
brasiliensis
Vitiphoenix sp.
Washingtonia robusta

Brevities

Palm Fertilizers

From time to time we receive inquiries from members about the best kind of manufactured fertilizer to use for feeding palms. In the absence of field tests and conclusions to be drawn from them, the inquiries cannot be answered with any exactitude. Moderate applications of 4-7-5 are usually beneficial if not allowed to come into contact with the roots. Potash is indicated of course when the effort is to slow foliage growth and to improve the yield of fruit, as with coconuts.

The Wilson & Toomer Fertilizer Company of Jacksonville manufactures a "Palm Special" fertilizer. We inquired the formula of them and quote from their reply.

"We have a mixture registered with the State Department as W & T's Palm Special (5-7-4), which analyzes 25% Natural Organic Nitrogen derived from Castor Pomace, Tankage and Ground Tobacco Stems with 1% MgO or water soluble Magnesia derived from Sulphate of Potash with Magnesia, balance of Potash from Muriate. This mixture, also, contains 3% MnO from Manganese Sulphate, .25% CuO from Copper Sulphate, .25% ZnO from Zinc Sulphate, .50% Fe203 from Iron Sulphate, .10% B203 from Borax and 3% from Sulphur."

The quotation is for the members' information, but is in no sense a recommendation of the fertilizer by the Society. Various manufacturers will prepare fertilizers mixed to the customer's specifications, if ordered in sufficient quantities.

Arenga Engleri

Confusion of species in the larger genera, such as Geonoma, is hardly to be wondered at because of the great multiplicity of species. But even the genus Arenga, with only a very few species, is still posing some questions for the growers.

Arenga Engleri is a current cause of wonderments, at least in Florida. At times it has been thought to be one and the same as *Wallichia caryotoides*, a palm of another genus; but here the question arises as to whether one plant has been propagated under two different names.

Arenga Engleri and *A. tremula* (*A. Ambong*) are sufficiently alike to raise doubts of their being two well-defined species. Seeking some word from a scientist who has studied the subject, we asked Professor H. H. Bartlett for an opinion. "They seem to me," he replied, "not to be specifically different." And he adds, "I had much experience with *A. tremula* in the Phillipines and took various photographs of it growing wild at several localities and also (before the war) in the remnant of the old Botanical Garden that was established in Spanish days outside the wall at Manila. I also met with it in

the Botanical Garden at Hongkong and photographed clumps along the path to the Peak, where it looked as if it might either have been spontaneously established from seeds of cultivated plants in the Garden or else have been a remnant of the wild flora."

Palms in Kenya

Dr. Frank Piers of Nairobi, Kenya, though not a member of the Society, has sent us the following comments on the palms in that part of Africa.

"It may interest your members to hear something about our indigenous palms, of which there are only a handful of species. Below the 5,000-ft. line, extending to the shores of the Indian Ocean, we have *Hyphaene thebaica*, the Doum palm, nothing much to write home about, though I know places on the southeast slopes of Mt. Kenya where it forms veritable forests. The Makindu palm, *Phoenix reclinata*, is common in swamps all over this country and Uganda, but generally looks rather untidy and scraggy; I do not think it is anywhere grown as an ornamental tree. The same applies to *Raphia Ruffia;* I think the most attractive part of it is the seed cones which are highly polished and very ornamental. The palm itself grows to enormous sizes along rivers and looks very 'tropical' but it is far too large for the average garden.

"Our finest palm is, in my opinion, the Palmyra palm, Borassus (I forget the specific name); a very imposing tree when mature; but unfortunately human habitation and Borassus seem to be mutually exclusive since it seems to prefer waterless country at low altitudes; the seed is eaten by elephants, who seem to be instrumental in propagating the plant. Occasionally one sees it in gardens or parks.

"Not indigenous to Kenya, but well known here is the famous Seychelles palm, *Lodoicea seychellarum*, which grows only in two secluded valleys of Praslin Island in the Seychelles. It forms very large curiously shaped seeds which are often imported here and used as ornaments. I could get some of these for collectors, but they are usually not viable by the time they arrive here and are really curios more than anything else. They are said to be the biggest seeds in nature. The palm itself refuses to grow outside its natural habitat and my friends of the City Park Department inform me that they never succeeded in germinating seed here.

"In the streets of Nairobi we have some ornamental Phoenix (I think the *canariensis* species), and a few Arabs on the Kenya Coast grow date palms, for sentimental reasons — they do not very well there. The ubiquitous coconut palm is of course not indigenous but imported."

(The so-called double coconuts, or seeds of Lodoicea maldivica *may take a great while to germinate. A very few young specimens are growing in the Western Hemisphere. One may be seen at the Atkins Garden in Cuba. Another, unless we are mistaken, grows in the Coconut Grove Palmetum. - Ed.)*

The Coconut Rhinoceros Beetle

Mr. Harold F. Winters, Horticulturist at the Federal Experiment Station, Mayaguez, Puerto Rico, calls our attention to Bulletin No. 45, "Life History, Habits, and Control of the Coconut Rhinoceros Beetle in Puerto Rico," by Harold K. Plank, a thorough and well illustrated exposition of the subject.

The beetle has been widespread in Puerto Rico, where its depredations have been both severe and extensive. It has also been reported from Haiti, the Dominican Republic and the U. S. Virgin Islands.

Presumably anyone interested in the Bulletin may still obtain it for 15 cents from the Superintendent of Documents, Washington. Mr. Winters points out that "this work was completed before the introduction of modern insecticides." To this he adds, "The author, Mr. Plank, is now with the Plant Quarantine Section, U. S. Department of Agriculture, San Juan, Puerto Rico, in case anyone wishes to write him about this work."

An Earlier Palm Society

Dr. Bruce Ledin sends us this one:

Col. Robert Montgomery presented a paper entitled "A Palmetum in South Florida," which was printed in the Proceedings of the Florida State Horticultural Society, Vol. 48, pp. 172-173. In this paper he explains how he started his palmetum and how he toured the state in search of specimens. He states:

" . . . I toured the state and secured as many large specimens of palms as I could to start my collection. I was fortunate in finding on the west and east coasts quite a number of introduced as well as native varieties. I was also surprised at the interest in palms in various parts of the state. In Orlando I was told that about fifty years ago (probably in the 1880's) they had a Palm Society and every member of the society was supposed to bring in some new species of palm from some part of the world and many of them did. I asked about the archives of that society and was told someone had them and would write it up. That was three years ago and nothing has been done about it. If there is anyone here from Orlando, I think that something should be done about this Palm Society."

Identifying Coccothrinax

Despite the similarities that exist between the genera Thrinax and Coccothrinax, Sargent rightly segregated the latter, basing the segregation on the notable differences shown in the scored, cerebroid fruit, with ruminate albumen of a very distinct appearance. Besides, the mature fruits of Thrinax are generally white or light in color, whereas those of Coccothrinax are nearly always black or else a more or less bright red. The leaf sheath also permits one to distinguish without hesitation a species of Thrinax from one of Coccothrinax; in the latter case, the sheath is clearly cylindrical, commonly formed of more or less rigid fibers which are strongly interwoven and in every case persistent on the trunk for many years if the thick protective layer formed by the sheaths has not been burned away by the fires intentionally set in the springtime. In Thrinax, the sheath is more irregular and not long persistent on the trunk.

—Hermano León

(Contribucion al estudio de las palmas de Cuba, III, p. 108)

THE RAIN FORESTS OF GOLFO DULCE, by Paul H. Allen (University of Florida Press, 417 pp., 34 photographic plates, many line drawings by Dorothy O. Allen, $8.50) is a new book containing a wealth of detail, with many keys and illustrations that will help to identify the plants of the Golfo Dulce region in southern Costa Rica. The work is essentially a manual without any narrative text. It is a different sort of manual, for its announced purpose "is to attempt to reduce the use of field characters, such as trunk, sap, leaf, and bark differences to some sort of organized system." Where the palms are so greatly outnumbered, as they are here, in the genera and species of other plants, they are still relatively conspicuous in the sea of trees and other woody plants. The palms of the region get their fair share of attention in this volume, and a dozen or more are illustrated. A valuable book, into which a deal of preparation has obviously been put, it will be indispensable to observers and students of the middle American flora.

Sources of Palm Seed

Once every week or so the Society gets requests for information about where to obtain palm seed. The answer, obviously, is "from palm trees," but that might seem an effort to be facetious. Collecting seed from the trees is sometimes good sport, but that is when the redbugs, mosquitoes, sandflies, niguas, garrapatas and other such vermin are accomodating enough to be absent; and also when the weather is not hotter than Beelzebub's own private furnace and the undergrowth not too thick and thorny. The trouble is, conditions for seed-collecting are not always ideal, and it is sometimes a grim and dogged business. But the worst trouble of all, which has nothing to do with physical discomforts, is that more often than not the seed one wishes to collect happens to be not in season and so not collectible either by the bushel or by one seed.

What to do when one has neither the inclination nor the means of getting about the planet in search of seed? A second question the grower should ask himself is whether he really must start with the seed, for today seedlings of upward of a hundred different palm species may be bought and thereby a year or two saved, a whole series of disappointments and headaches averted, and a laborious task avoided. But some people wish to start with the seed, with or without the insects and headaches, and it is to them that these words are addressed.

Should one wish to grow each year a million Howea seedlings for sale to the Messrs. Woolworth *et al*, the best place to get the seed would be from a seed dealer or else direct from Lord Howe Island. For a program less ambitious, the seed dealers are not usually a good bet. They do not wish to sell seed by the packet, but by the quart, peck or carload; and besides they stock few kinds of palm seed, and one cannot refrain from suspecting that the seed may not be viable if it has been stored for even a short time.

The grower might begin, then, by asking to have his name placed on the seed-distribution list of the U. S. Plant Introduction Garden, Coconut Grove, Florida. Small packets of palm seeds, not readily obtainable elsewhere, are occassionally distributed from the Garden, but the supply is limited and might not be sufficient to go around if an excessive number of requests were made. Not all the established palms in the Garden have fruited.

We treated of other seed sources in Bulletin 4, P. 3, mentioning the names and addresses of 5 members who could on occasion furnish seed or who wished to exchange it — one each in Miami, the Canal Zone, France, Japan and Cuba. In Bulletin 2, pp. 4-5, attention was drawn to a list of 36 of the commoner palms at the Sub-Tropical Experiment Station near Homestead, Florida, from which seed when available may be had.

Recently two members in two other parts of the hemisphere have offered to supply seed. Mr. Walter Braun, Sociedad de Hermanos, Primavera, Alto, Paraguay, states: "Seeds of our native palms here — *Butia Yatay* (dwarf palm), *Acrocomia Totai* and *Copernica australis* are available. As the U.S.A. require control I need labels for the control office." Mr. George R. Proctor, Botanist, Science Museum, The Institute of Jamaica, Kingston, Jamaica, B.W.I., says: "We shall be glad to supply seeds of any Jamaican species to members elsewhere, should they be interested."

Several months ago we had proposed to compile a Seed-and-Plant Exchange List, sending it only to those members who would request that their names be placed upon it. Only 7 members made the request, so that the project is being held in abeyance until such time as the effort and expense would be justified by a greater interest. In the meantime the names and addresses of the seven are listed below, in order that they may determine what can be accomplished, if they wish, by corresponding among themselves.

Mr. Eugene D. Kitzke
C/o S. C. Johnson & Son, Inc.
Racine, Wisconsin

Mr. Alexis V. Lapteff
47-26 160th Street
Flushing 58, N. Y.

Mr. Otto Martens
1020 El Sur Avenue
Arcadia, Calif.

Mr. Edwin W. Moore
1159 Missouri Street
San Diego 9, Calif.

Mr. James E. Smith
P. O. Box 508
Oakland Park, Florida

Mr. Martin J. Wittbold
1084 Ridgewood Avenue
Holly Hill, Florida

Mr. Harrison G. Yocum
253 W. Laurel Street
Bethlehem, Pa.

Beyond this, we are considering the advisability of including in PRINCIPES a section of classified advertising, not so much as a producer of revenue - it would not produce much - as a convenience to the buyers, sellers and exchangers of palm plants and seed. The question of its advisability (and there is some question as to whether the Society should countenance any kind of advertising) is being referred to the Directors.

Seed and seedlings, if not all one, are but one step removed. Concerning the availability of certain palm seedlings, in this case Copernicias, Mr. Robert T. Van Tress, Horticulturist at the Garfield Park Conservatory, 300 N. Central Park Boulevard, Chicago 24, Illinois, advises that the Conservatory has a surplus of Copernicia seedlings in 6-inch pots which it will exchange for other palms not now in its collection. "We are also interested," says Mr. Van Tress, "in rare foliage and flowering plants, particularly Aroids and Gesneriads. Those members interested in arranging an exchange should send me a list of material available for exchange." Here follows a list of the Copernicia collection, in which each asterisk signifies no plants available for exchange.

Copernicia australis
Baileyana
Burretiana
*cerifera
Cowellii
Curbeloi (2)
hospita
humicola (2)
*ramosissima
rigida
Sueroana (C. rigida x hospita)
*tectorum
Torreana
*vespertilionum
*Yarey
*Cowellii x hospita hyb. No. 45
*Cowellii x hospita hyb. No. 1

IF ONLY plant collectors and explorers would collect, together with their palm material, soil samples for later analysis, it would be of tremendous aid in the culture of palms far removed from their habitats. So, for that matter, would be notes on the approximate altitude, rainfall, degree of shade or lack of it, and the absolute minimum temperature, either recorded or probable, at or near the site.

O. F. Cook forcefully makes a point generally ignored. "Many of the palms are definitely adapted to particular conditions, as of soil, moisture and access of sunlight. Nobody appreciates as yet the extent of such specialization. In introducing a new palm, the habits and cultural requirements must be known, as well as the size the palm may reach, and its distinctive features or special uses. Thousands of residents of Florida wish to grow more kinds of palms, and are anxious to know what precautions are necessary, but there is no alternative to learning the habits of the different kinds."

The Palmyra Palms

Because estimated numbers are not always accurate it might be rash to say that any one palm is represented by more individuals on the face of the earth than any other. Still, the Palmyra palms would be high on the list of candidates for first place in numbers. The Coconut palms girdle the entire globe and in that respect have no competitor, but immense as their numbers are they do not occupy the great land masses pre-empted by the Palmyras. And if the term "Palmyra palm," applied in its strict sense to *Borassus flabellifer*, be stretched to include all seven recognized species of Borassus, then to the already astronomical numbers of *B. flabellifer* in Asia must be added vast stands of *B. ethiopum* in Africa and all the representatives of all the other species.

Despite the great natural dispersion of the Palmyras and their apparent adaptability to a wide range of growing conditions, it is doubtful that established specimens can be found today in more than half a dozen "stateside" gardens. There are reasons, nonetheless, for believing that the Palmyra would be suited to favorable locations in Florida up to the 30th parallel, and it might be worth trying in the warmer coastal parts of California. The risk should be small from La Jolla to the Mexican border, and for all that may be known to the contrary, success might attend efforts to grow the palm at points farther north such as Santa Monica. Gambling with the outcome, or, if you please, taking a "calculated risk," is not too novel in the planting of palms anyhow. Though in India the Palmyra flourishes in greatest numbers in the hottest regions, it is found as far north as 30° where it withstands cool winters and an occasional frost.

There are several reasons why the Palmyra has not been generally propagated and planted in the Western Hemisphere. Though suitable for extensive grounds and parks, it is too massive for the average dooryard. Fresh seed are anything but easy to obtain, and must be imported; the trees are dioecious, and this tends to postpone the time when a domestic supply will be available. Established trees cannot be readily transplanted if at all, hence the Palmyra is not grown in nursery rows. Germinating the seed in a container poses a problem, for when Palmyra seed germinates it first sends down into the soil a hypocotyl to a considerable depth, and afterward the plant forms roots and ascends. This problem may be solved by sowing the seed *in situ*, but then an open space not less than twenty feet wide must be provided while the seed germinates and the resulting plant slowly grows up to its proportions during several years. At least one nurseryman, however, has gone to the trouble of germinating the seed in containers four feet tall and now offers the seedlings for sale.

An excellent account of the Palmyra palms was written by the late Dr. David Fairchild and is contained in Occasional Paper No. 15, Fairchild Tropical Garden, "The Introduction of the Borassus Palms into Florida," which he introduces as follows:

"The *Borassus* palms deserve to be known by the residents of South Florida for they are landscape trees which may someday I trust add a striking tropical note to the parks and driveways of this garden paradise. They attain to great size: a hundred feet in height and seven feet through at the ground. Their massive fan-shaped leaves are often six feet across and ten feet long and their fruits are a third the size of average coconuts, with edible pulp and with kernels which are much appreciated by those who live where they are common."

Dr. Fairchild describes in the cited Occasional Paper three species of Borassus which he had seen in Asia and Africa. Because of an ugly bulge in the trunk of the African species he thought it not nearly so handsome as the *B. flabellifer*

of Ceylon. The succeeding paragraph is from his paper.

"As described in the account of the first Allison Armour Expedition on the yacht 'Utowana' (see 'Exploring for Plants' 312-16) I first saw groves of the Borassus palm, called there the 'Palmyra' palm, in northern Ceylon. The peninsula which forms the northern tip of Ceylon is strikingly like the peninsula of Florida in that it has a similar limestone soil underlaid with fresh water and covered with light sand, and has a rainfall of 48 inches. When we arrived by train at Jaffna one morning in early February, 1926, my friend and colleague Howard Dorsett remarked "We're in Fort Lauderdale, Fairchild." And to all appearances we were. There were the same stone fences, the same coral rock and oolitic limestone, shallow wells everywhere with well sweeps instead of pitcher pumps drawing up water from a depth of eight or ten feet and what looked at first like Florida cabbage palms scattered over the landscape. But they were twice as big or more, these Palmyra palms, with immense leaves and almost black stems, some of them 60 feet high."

Going back more than one hundred years we find that various writers had been impelled to expatiate upon the Palmyras and their manifold uses and products, edible fruits and seeds, "dantalas," toddy, vinegar, sugar, troughs, pipe, utensils, building materials. In 1850 William Ferguson published a 100-page popular Description of them, and ten years later Seemann wrote about them at length in his "Popular History of the Palms." It is from this century-old book of Seemann's that the following somewhat antiquated but still valid comments have been taken.

— D. S.

Borassus

BERTHOLD SEEMANN

(From "Popular History of the Palms," London, 1856)

Remarkably straight trunks, often seventy feet high, fan-shaped leaves, with spiny petioles, dioecious flowers appearing in the axils of the leafstalks, and large brown drupes, containing three seeds (*pyrenae*) each, are the most characteristic features of *Borassus*, a genus found in Africa and Asia. Little is known of the African species (*B.? AEthiopum, Mart.*), which grows between the latitude of the Cape de Verde Islands and Benin, and the young seedlings and fruits of which are eaten; but we possess vast stores of knowledge about the Asiatic species (*Borassus flabelliformis*, Linn.), a plant cultivated in our gardens. The terms "vast stores of information" were used advisedly; for so much has been written upon this Palm, that William Ferguson was able to produce a pamphlet of nearly one hundred closely printed pages on the subject.

Borassus flabelliformis—best known in the countries in which it abounds by the names of Tal, Tal gaha, Trinrajan, Lontar, Palmeira, or Palmyra,—is one of those Palms enjoying the widest geographical distribution. A glance at one of the maps in Berghaus's or Johnston's Physical Atlas, showing the range of the most remarkable plants, will help to illustrate this fact. There will be found the word *Borassus flabelliformis* written in a curve beginning on the north-eastern parts of Arabia, in about 20° north latitude and 54° east longitude, extending through the Indian Ocean and the southern parts of Hindostan, and ending in about 20° north and 93° east, in the Bay of Bengal.

The Palmyra is met with on both sides of the Persian Gulf. Immense groves of it are found on the Malabar coast, extending from Cape Comorin through Travancore, Calicut, Goa, and the Bombay Presidency, on through Gujerat, and up some distance on the banks of the Indus

in Scinde. But what are emphatically called the Palmyra regions may be included in a line extending along the Coromandel coast from Cape Comorin to Madras, including the northern portion of Ceylon, thus passing through Tinnevelly, Tanjore, Pondicherry, etc., and from Madras all along, taking in a considerable belt of the coast between that and Point Palmyras, and then passing up to Gya on the 85th degree of east longitude, and nearly 25° of north latitude. After that the line should be carried on about due east until it reaches Ava, the capital of Burmah, below which, on the banks of the Irrawaddy, there are immense groves of this Palm. From Ava the line should pass down southeast, through the Malayan Peninsula and the Indian Archipelago, including Sumatra, Borneo, Celebes, Floris, Ceram, Amboyna, the Molucca Isles, and perhaps the Island of New Guinea.

The extent of this distribution, in a southeasterly direction from Arabia, in about 54°, to New Guinea, in about 140° east longitude, is about 86°, —5160 geographical miles, or about one-fourth of the circumference of the earth! The Palmyra extends in various parts of Asia to between the 25th and 30th degrees of north latitude; the island of Timor is its southern limit; so that it may be said that the region of this Palm is situated between 10° south and 30° north latitude, and 54° and 140° east longitude.

The Palmyra is found in various parts of the mountain districts of Ceylon, including the vicinity of Kandy and Badulla, at elevations of 1680 and 2450 feet respectively, and having a mean annual temperature of about 74° at the former, and by calculation of the difference in altitude, a mean annual temperature of 71° at the latter. Yet although, as already stated, immense groves of this Palm are met with on the banks of the Irrawaddy, from the sea-coast up to nearly as far as Ava or Amarapoorain Burmah, and as far inland as Gya in Bengal, and in isolated patches throughout Ceylon, still the most congenial places for its development are low sandy plains, scarcely elevated above the level of the sea, exposed to the burning sun and the force of at least one of the monsoons. Such are Jaffna, with its surrounding islands, and other portions of the northern province of Ceylon; such the district of Tinnevelly, with portions of the Madura Collectorate; portions of the Madras and Bombay Presidencies, and of the Indian Archipelago.

An estimate may be formed of the number of Palmyras existing on the globe by Ferguson's calculation of those living in the Jaffna peninsula and the islands adjacent. He says:—"The area of Jaffna peninsula and the islands is about seven hundred square miles: I think we may safely assume that one-fourteenth of this surface is covered with Palmyras. If so, fifty square miles, equal to 32,000 acres, at the moderate average of two hundred to an acre (according to my calculation, three hundred trees can be *planted* on an acre), would give a total of 6,400,000 trees; the population being 200,000, this estimate, if correct, gives thirty-two trees for each individual person."

Few trees are better adapted for sheltering animals than the Palmyras, and hence they are resorted to by birds at night, and by rats, squirrels, mongooses, monkeys, maranayas (*Felis Vivenina*,) etc., during the daytime. When a tree has its old leaves undisturbed, the number of bats sometimes found occupying it is incredibly great. The grooves of the petiole, and the whole construction of the leaves, are well adapted for conveying the rain; and everything falling upon the foliage towards the trunk of the tree gives nourishment, especially on trees in a wild or unpruned state, to numerous species of epiphytical plants, orchids, ferns, figs, etc. In Ceylon an Orchid, termed by the natives Parang Catate, often encircles the trunk at various heights displaying beautiful tassels of pink-coloured flowers. But the most generally conspicuous and interesting union of the Palmyra with other plants is that formed with ten or twelve species of fig,

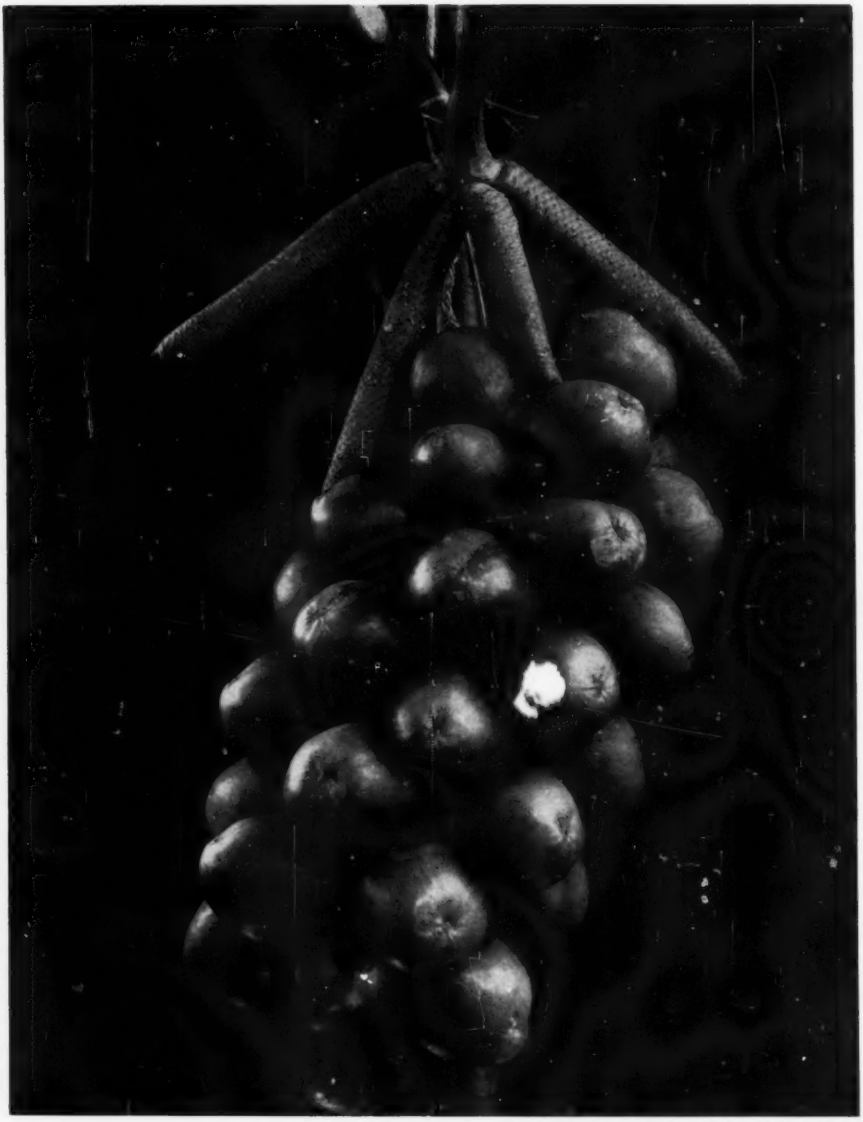
FTG Occas. Paper 15, David Fairchild

A glade between groups of tall Palmyra palms in Northern Ceylon. The young palms are coming up through the sandy soil where the seeds were scattered over the ground and covered lightly months before. The old palms in the background are nearly seventy feet high and have smaller leaves than younger specimens. They have long since shed their leaf bases. Jaffna, Ceylon, 1926, Allison V. Armour Expedition (Borassus flabellifer).

including the Bogaha (*Ficus religiosa*, Linn.), the Gan-Attika (*F. glomerata*, Roxb.), and the Nuga-gaha, the true Banyan-tree of the English (*F. Indica*, Linn.). In Ceylon and India Proper many of these united trees are met with. There is especially one remarkable specimen of a Banyan having two or three Palmyra trees growing in it, at Kaythady, four or five miles from Jaffna, on the road to Chavagacherry, which covers one and one-twelfth acre of ground. This is perhaps the largest Banyan-tree in Ceylon, and a favourite resort for pleasure parties from Jaffna. It probably commenced its existence in the leaves of one of the Palmyras, the coronets of which now surmount its foliage and thousand stem-like aerial roots. The knowledge we possess of the way in which these unions originate warrants us in presupposing this; when the fruits of the Banyan are ripe, various species of birds flock to eat them, and these, when they alight on the Palmyras, drop the seeds in the axils of the leaves, where they germinate and extend their roots, so as in time to embrace the parent Palmyra, except its upper parts. The top of very old Palmyras is just seen issuing from the stem of the Banyan, as if it grew from there, whereas it runs down through the centre, and has its roots in the ground, the Palm being the oldest. For such a union the Hindoos entertain a religious veneration, saying it is a holy marriage, instituted by Providence.

The number of uses for which the Palmyra is employed, may be said to be almost infinite; indeed one of the eastern languages, the Tamil, spoken in a portion of the region which the tree acknowledges as its native country, possesses a poem, entitled 'Tala Vilasam,' enumerating no fewer than 801 different purposes to which the Palmyra may be applied, and this poem by no means exhausts the catalogue. The roots are perhaps the only parts of the plant to be regarded as worthless in an economic point of view; that is, if we reject the information of the natives, according to whom their sap, as well as that of the trunk, is used to cure sores created by the "falling of spittle," and also in cases of dysentery. The young plants, namely those about two or three months old, called Kelingoos in Ceylon, are an article of food, and cultivated for that purpose; the seeds being sown in six to eight layers, under loose sandy soil. These Kelingoos, if not eaten fresh, are deprived of the parchment-like covering in which they are enveloped, dried in the sun, and thus kept for future use. Those dried in this manner are, when raw, emphatically called Odials; and after they are broiled, Poolooc Odials. It is the former which, reduced to flour or meal, serve for the preparation of the favourite *Cool*, or gruel of the Singalese. The Kelingoos roasted, boiled, or cut into slips and fried like those of the Bread-fruit, are eaten by the natives of Ceylon, and are to be found in the bazaars of Colombo and other parts of the island throughout the year. It is of the Odials, according to Bennett, that the flour, once so prized by the Dutch, is made: I say, once so prized, for at the present day we never hear of its being sent to the Cape of Good Hope, Holland, or any other countries inhabited by the Dutch. The Singalese also prepare a dish called Putoo, considered a great delicacy, of the Kelingoo flour. To the meal is added a little water, some prawns or small fish, scrapings of Cocoanut kernels, unripe Jack-fruit (the produce of *Artocarpus integrifolia*), etc.; this mixture is put into an ola (*i.e.* Palmyra-leaf) basket, placed on the top of a pot of boiling water, covered over with a chatty, and cooked by the steam. Putoo is occasionally eaten with rice as a curry, and also with jaggery (or Palm-sugar).

A full-grown Palmyra is from sixty to seventy feet high; its trunk at the bottom is about five and a half feet, at the top two and a half feet, in circumference. Its wood is favourably known in Ceylon and the maritime ports of India. Large quantities of it are exported from Point Pedro and other parts of Jaffna to Madras and Colombo. At certain seasons of the year, the felling, splitting, dressing and ex-



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Fruits and male flower cluster of the Borassus palm of West Africa (Borassus ethiopum). The growers of this palm and its close relative in Ceylon are fond of the sweetish fruit-flesh and like the mango eaters, where stringy seedlings are grown, they suck the pulp out from the fibers and enjoy its sweetish flavor. The male flower spikes were taken from another palm; a male palm. Bathurst, Gambia, Allison V. Armour Expdition, 1927.

porting of it give work to thousands of the Tamil people of the northern peninsula of Ceylon. The trees have to arrive at a considerable age before they are of use for timber; when a hundred years old, they are excellent; but it is a well-known fact, that the older they get, the harder and blacker does the wood become. Its durability has also been well tested: there being doubtless many buildings in Ceylon which have rafters more than a century old. Its specific gravity is, according to Mr. Mendis, sixty-five pounds per solid foot. Pillars and posts for the verandahs of the houses, well-sweeps, etc., are made of this timber. In the sandy parts of Jaffna, where water is found near the surface, and where, from the strong winds and other causes, the wells are liable to be filled up, a hollowed part of the trunk of a Palmyra is inserted, and forms a well, from which many a thirsty traveller refreshes himself. Palmyra trunks split into halves, with the heart scooped out, are used as spouts for various purposes, but more especially for carrying away the water from the eaves of houses. The thick parts of the trunks are generally taken for rafters, the thinner or tops for reepers (laths). The trunks of young trees or the tops of old ones are often cut into pieces, split, and placed where game is plentiful, as in the Patchelepalla district of Jaffna. The wild hogs and hares are very fond of the soft, white, spongy hearts of the logs, and in resorting to them to eat, are frequently shot by the natives. The dark outside wood of very old trees is used to some extent in Europe for umbrella handles, walking canes, paper rulers, fancy boxes, wafer-stamps, and other articles. The workman operating on this wood has to be extremely careful, as when split some of the wiry fibres get loose, and are apt to run under the nails of his fingers, or into the flesh of his hand. It is stated that that side of the trunk exposed to the south wind is the thickest, hardest, and best. The natives, if not quite certain of the age or quality of the trees to be felled, often cut a notch in the trunks near the ground, to see how far the black wood extends, a test which in most instances holds good. From the wound thus made a large quantity of sap frequently runs, which must not be confounded with the toddy obtained from the spathes; it forms a slimy, useless jelly on the tree, and is not, as has been asserted, the bdellium. Rumphius, whose authority is generally quoted to cover this mistake, has not written a word which could support such a statement— a statement, as Ferguson justly remarks, as preposterous as the supposition that *Areca Catechu* yields the catechu of commerce.

But to return to the timber. It is well known in India that the female tree produces the best and hardest, and that of the male, notwithstanding Rumphius' assertion to the contrary, is considered so inferior that, unless the trees are very old, it is never used. Buyers and sellers of the Palmyra rafters should always choose the blackest and heaviest, but bear in mind that the natives add weight and colour to the white rafters of young trees and those of male ones, by steeping them in salt water. If there is any suspicion that such a fraud has been practiced, an adze or axe should be used. If the timber is good, it will be found very hard, and fly away in chips, displaying the ends of the dark wiry fibres thickly packed together: if bad, or if it has undergone the "salt-water cure," it will be found soft and spongy, with the fibres far apart, and the other parts composed of fecula or farina like sago. Vessels are never built exclusively of Palmyra wood; they would be too heavy to float with a cargo, but the rails or bulwarks and the roofs or decks of Dhonies are often made of it. In Jaffna where Palmyras are plentiful, they sell at from three shillings to six shillings each; a single tree will yield from three to four rafters, and if cut entirely into reepers (laths), the number is fifteen. One hundred rafters, sixteen cubits in length, sell at Colombo for about 17 pounds .10s.

The trunk is generally simple, but occasionally it is more or less divided. Ferguson says:—"The first of such trees I

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Three ripe fruits of the Palmyra Palm of Ceylon (Borassus flabellifer) laid at the roots of the palm that bore them and on their left several seeds from which the fibrous husk of the fruit has been removed. These seeds were dug up from the bed where they had been planted to germinate and produce the sinkers or "Dantalas" so much prized as a delicate vegetable by the Tamils. Jaffna, Ceylon, 1926.

saw had four heads then upon it, but with marks where three or four others had been. These divisions began about twenty-five or thirty feet from the ground. I noticed one near Oodooville with six heads on it. One of them grew nearly in a line with the body of the tree, while the other five formed a whorl, but bending somewhat outward before they could attain their upright posture. There were marks where other three had been. The Palm-tree mentioned by Forbes in his 'Oriental Memoirs,' as having about forty heads, was probably a Palmyra."

The leaves (or olas), on trees in the jungle, or at a distance from human habitations, will be found extending until the tree attains a height of twenty-five to forty feet from bottom to top, the older ones displaying their stalks only, the blade or fan part having rotted away. A tree thus armed with the silicious and serrated edges of the petioles (which latter are from three to four feet long) is a formidable object to encounter, as he who has to ride through groves of them readily admits; a Tamil proverb says, "What he saw was a snake, but what bit him was a Palmyra leaf." The foliage is distributed on the trunk in three spiral rows, beautifully ascending from right to left in some, and from left to right in others. The blade of the leaf has from seventy to eighty rays, diverging from the end of the stalk in nearly an entire circle, but are not able, from the breadth of the leaf, to spread horizontally, thus giving a section of the leaf a serpentine form. Each tree has from twenty-five to forty fresh green leaves upon it at a time, and of these the natives frequently cut off twelve or fifteen annually, or a greater number once in two years, to be devoted to various purposes, as well as with the view to enable the fruit to ripen and increase in size.

The male and female flowers of the Palmyra are generally produced by two different trees (*dioecious*), but sometimes, as in the case stated by Ferguson, they are found upon one individual tree (*monoecious*). The difference of sexes in the trees is not observable until the inflorescence has appeared. The appearance of this organ, about the twelfth or fifteenth year after the trees have been planted, marks an epoch in the life of the Palmyras. They may be said to have come of age, and henceforward begin to play an important part in the domestic economy of the natives. They now yield toddy, a beverage almost as famous for its use as notorious for its abuse, and obtained by a very singular process.

At the season when the inflorescence begins to appear, and before the spathes have had time to burst, the *toddy-drawer* is at work in the Palmyra groves. His practised eye soon fixes on those trees fit for the "scalping-knife," and if they have not dropped the footstalks of the leaves, the first operation, if the trees are valuable, is to wrench them off. This done, the toddy-drawer, armed with his leathern protector for his breast, his raceme-batten of wood, his small thongs, straight and crooked knives, with the side leather-pouch to contain them, procures a piece of tough jungle vine, or a strip of the stalk of a young Palmyra or Cocoanut tree, which he converts into a sort of loop, of such dimensions as to admit his feet getting through to a space large enough to allow them to clasp the tree. This done, he puts his feet in this thong, stands close to the tree, stretches himself at full length, clasps it with his hands, and pulls his feet up as close to his arms as possible; again he slides up his hands, and repeats the same process, until, by a species of screw-process, he ascends to the summit of the tree. When the trees are high, use is occasionally made of hoops, of the same material as that of the thong, large enough to encircle both the tree and the toddy-drawer, so that it affords always a support to the body while the climber is in the act of taking a fresh grasp. Arrived at the summit, amongst the leaves, the toddy-drawer lays his climbing apparatus across a leaf-stalk, and commences the pruning and phlebotomy. Leaving one or two of the lower leaves as a support for his body

until the operation he is about to perform is completed, he frees the tree, by means of a crooked knife (on a small scale resembling a reaping-hook), of all the accumulated dirt, and cuts off all the leaves, except three or four and the top bud of the tree. Besides the removal of all this, the crooked knife is now used in shearing off the outer covering of that part of the tree from which springs the foliage and inflorescence. The various spathes are supported during this operation by being tied up by several thongs to the footstalks of the uncut leaves. The pruning having been completed, all or most of the spathes are effectually encompassed from end to end by thongs, to prevent the inflorescence from bursting forth. Thus tied, they are beaten and crushed between the wooden battens. This operation is repeated for three successive mornings, and on each of the following four a thin slice is cut from the points of the spathes; and all this is done in order to keep them from bursting and to encourage the flow of sap. On the eighth morning a clear, sweet liquor begins to flow from the wounded parts, which is indicated by the toddy-birds (*Artamus uscus*?) and crows fighting and chattering among the trees. The toddy-drawer then ascends again in the morning with the chatties, or toddy-receivers, in which he places the ends of the spathes, and leaves them until the evening, when they are found to contain a quantity of this liquor. The operation of attracting the juice is repeated every morning and evening, or in the mornings only, until the whole spathe is sliced away. The trees are drained in this manner for several months in the year; but it is said, that if the operation is repeated on the same tree three successive years without allowing any of the spathes to burst, the trees die. According to Mrs. Tucker, a spathe continues to give toddy for five months; and while it is seldom that three spathes are yielding toddy on the Cocoa-nut tree, seven or eight will yield juice at once on the Palmyra. An expert climber can draw toddy from about forty trees in a few hours. In Jaffna a distinction is made between "toddy" and "sweet toddy;" the former, called by the Tamils "culloo," is the fermented, the latter the unfermented juice. It is amusing to notice the various comparisons to which toddy, in general, has given rise. Sir William Jones compares it, fresh from the tree, to Poubon water, fresh from the fountain, or to the best mild champagne; Malcolm, the American, associates its taste with his native cider; while Johnson, a traveller in Abyssinia, ranks it no higher than ginger-beer! It is possible that it bears a certain resemblance to all three, and indeed a good deal of the Ceylon ginger-beer is made from toddy. The result of partaking of it early in the morning is, upon most constitutions, a listless, drowsy sensation, much the same as that of beer when drunk in the heat of the day,—of course, only within the tropics.

HOW TO JOIN THE SOCIETY

Anyone keenly interested in the palms may join the Society by notifying the Secretary of his wish to be enrolled.

The Society has no fixed dues at present, for moderate dues, with the still small membership, would not produce enough revenue to pay all expenses of operation. It is relying for its support upon voluntary contributions from the members in such amounts as their circumstances warrant. This method of support is being tried out for an experimental period of one year. Nevertheless the Society must have funds in order to subsist at all, and prospective members are urged to send a check, if able to do so, at the time of their application for membership—which would obviate the necessity for solicitation, thus saving time and expense.

Please address the Secretary: Mrs. Claire Hargert, 195 Halifax Drive, Ormond Beach, Florida.